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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/492,557 01/27/00 ANTHONY

T 10990034-1

022879 MM21/0917  
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INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS CO 80527-2400

EXAMINER

KIELIN, E

ART UNIT

PAPER NUMBER

2813

DATE MAILED:

09/17/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.  
**09/492,557**

Applicant(s)  
**Anthony**

Examiner  
**Erik Kielin**

Art Unit  
**2813**



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Aug 20, 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3, 8 20) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

1. Claims 1-5, 9, 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by **Lutes** (US 4,455,626).

**Lutes** discloses a MRAM cell comprising a sense layer 11 and a keeper structure 12, 13 which formed of a ferromagnetic material, such as Fe-Ni with (1) an easy axis oriented perpendicular to the easy axis of the sense layer; (2) a shape that provides flux closure: a path for magnetic flux transport between a pair of opposing edge regions of the sense layer; and (3) inherently prevents disruptions to the magnetization state in the sense layer 11. (See Fig. 1; column 1, line 63 to column 2, line 43.) It is held, absent evidence to the contrary, that the keeper structure inherently prevents magnetic disruptions (e.g. demagnetization fields) to ends of the sense layer. See In re Best, 195 USPQ 428 (CCPA 1977) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Regarding claim 5, see Fig. 6a wherein the keeper structure is 30 which encases the read/write conductors 14-17 and the sense layer (called "memory layer") is combined with the flux concentrator layers 12', 13'.

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2. Claims 1-4, 6-10, 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by **Chen** et al. (US 5,748,524).

**Chen** discloses a MRAM cell comprising a sense layer/reference layer 21/23, 41/43, tunnel barrier 22, 42, and a stabilizing structure 30, 55 which is formed of a soft or hard ferromagnetic material with (1) an easy axis [in the case of the soft magnetic material] or a magnetized axis [in the case of the hard magnetic material] oriented perpendicular to the easy axis of the sense layer; (2) a shape that provides flux closure: a path for magnetic flux transport between a pair of opposing edge regions of the sense layer; and (3) prevents disruptions (e.g. demagnetization fields) to the magnetization state in the sense layer 11. (See Figs. 5-8; columns 3-6.)

3. Claims 1-9, 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by **Hurst** et al. (US 5,956,267).

**Hurst** discloses the sense layer / tunnel layer / reference layer stack 70 (Fig. 8, column 6, lines 27-42); the stabilizing structure “keeper” (30 in Figs 6-8; in trench in Figs. 9-13; column 5, lines 27-47) formed of a magnetically permeable ferromagnetic material which (1) inherently prevents disruptions to the magnetization state in the sense layer; (2) has a shape that provides flux closure: a path for magnetic flux transport between a pair of opposing edge regions of the sense layer; and (3) applies a magnetic field to a set of edge regions which is **perpendicularly oriented** to the easy axis of the sense layer **in the absence of an electric current flowing** through the wordline. (See Fig. 16 which shows the magnetic flux **only while current is flowing**

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through the wordline; column 7, lines 6-15. See also Applicant specification, page 7, 1st paragraph which indicates that the magnetic field lines orient in the same manner as in Hurst when a current is flowing through the wordline.) If the magnetic field in the keeper 120 aligns as shown in Fig. 16, “[u]pon application of current in the wordline 120” (column 7, lines 9-10) it is clear that the alignment is **not** as shown in it the absence of the current, which means it is “substantially perpendicular” as presently claimed in the instant application.

It is held, absent evidence to the contrary that the keeper structure inherently prevents magnetic disruptions to the sense layer. See In re Best, 195 USPQ 428 (CCPA 1977) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980). In this regard, it is noted that **WO 00/42324** (based on US patent application 09/318,073 with *priority date* 5/25/99 as provided in Applicant’s IDS of 5/15/01) assigned to the same assignee as the **Hurst** patent, discloses that the keeper layer does indeed prevent magnetic disruptions to the sense layer (page 15, lines 12-15).

Regarding claim 2, see Fig. 13, column 7, lines 32-47.

Regarding claim 3, see Figs. 15-16, column 7, lines 6-15; lines 33-47 -- especially lines 32-34).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-12 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hurst** in view of **Chen**.

The prior art as explained above discloses all of the limitations of the claims except for (1) perhaps for indicating that the easy axis of the stabilizing structure is substantially perpendicular to the easy axis of the sense layer; (2) forming the stabilizing structure from a hard ferromagnetic material; or (3) indicating whether the reference or the sense layer is adjacent the keeper structure.

Regarding (1) and (2), **Chen** teaches the benefits of stabilizing the ends of the sense layer substantially perpendicular to the easy axis of the sense layer, by using either soft or hard ferromagnetic material (column 4, lines 58-63; column 6, lines 5-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a hard ferromagnetic material to stabilize the end regions of the sense layer in a perpendicular to the easy axis of the sense layer and to use a hard ferromagnetic material as taught by **Chen** for the reasons indicated therein.

Regarding (3) given that both the reference and sense layers separated by the tunnel barrier are in the bit line 70 of **Hurst** (as indicated at column 6, lines 27-42), and that it is not indicated as to which of the permalloy layers is the reference and which is the sense, it is an obvious a matter of design choice as to which layer is closest to the keeper structure. Also given

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that the specification indicates that it doesn't matter, the instant application provides no evidence of unexpected results for one orientation over the other.

It would have been obvious to one of ordinary skill in the art at the time the invention was made as a matter of design choice to have either the sense layer or the reference layer adjacent the keeper structure as the keeper structure would still serve the intended purpose in for either orientation.

#### *Response to Arguments*

6. Applicant's arguments filed 8/20/01 have been fully considered but they are not persuasive.

Applicant argues that each of the **Hurst** and **Torok** keeper layers provide a magnetic field that is parallel to the easy axis of the sense layer, but each of the applied references shows that the magnetic field lines along the edge regions are, in fact, perpendicular. Therefore, Applicant's argument appears to be in error.

#### *Conclusion*

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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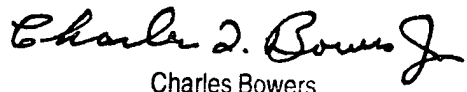
MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication from examiner should be directed to Erik Kielin whose telephone number is (703) 306-5980 and e-mail address is erik.kielin@uspto.gov. The examiner can normally be reached by telephone on Monday through Thursday 9:00 AM until 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached at (703) 308-2417 or by e-mail at charles.bowers@uspto.gov. The fax phone number for the group is (703) 308-7722 or -7724.

  
EK

September 12, 2001

  
Charles Bowers  
Supervisory Patent Examiner  
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